

EFFECTIVE PUBLIC HEALTH STRATEGIES TO REDUCE THE BURDEN OF NON-COMMUNICABLE DISEASES IN THE GULF REGION

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ABSTRACT

Background: We conducted an analysis of the global burden of disease (GBD) values of six Gulf countries (Saudi Arabia, Bahrain, Kuwait, the UAE, Qatar, and Oman) to determine the leading risk factors of morbidity and mortality in the region.

Materials & Methods: We obtained the values for the leading causes and risk factors for the six Gulf countries during 1990–2010. Disability-adjusted life year (DALY), years lived with disability (YLD), and years of life lost (YLL) values were analyzed for individual countries and in combination to obtain the summary GBD values for the Gulf region.

Results: The burden of non-communicable diseases, including major depressive disorders, cardiovascular disease, lower back pain, diabetes, and mortality due to road traffic accidents, increased significantly in the Gulf countries during 1990–2010. The leading risk factors were high body mass index, dietary consumption patterns, high fasting plasma glucose, and high blood pressure.

Conclusion: The results indicate the need to re-orient regional public health strategies by targeting the leading risk factors, which are largely influenced by behavior. We suggest a set of broad-based public education programs aimed at modifying lifestyle behaviors, raising awareness about the risk factors, and increasing public outreach. The cooperation of several stakeholders is required to reduce the future burden of non-communicable diseases.

Keywords: Non-communicable diseases, Gulf region, DALY, behavioral risk factors

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INTRODUCTION

The Gulf countries located in the Arabian Peninsula – Oman, Saudi Arabia, Bahrain, Kuwait, the UAE, and Qatar – have a unique historical, socio-political, cultural, and demographic cluster with high income from oil

revenue. The region has experienced an epidemiological transition due to rapid economic growth and urbanization. During the last three decades, government spending on healthcare has consistently increased in the Gulf region. As a result, the health priorities mentioned under the Millennium Development Goals were fulfilled (such as lower child and maternal mortality rates, and reduced infectious disease mortality rate)¹. However, non-communicable diseases (NCDs) still result in high mortality and morbidity rates. The four NCDs that contribute the most to the burden of disease are cardiovascular diseases (CVDs), cancers, chronic respiratory diseases, and diabetes^{2–4}.

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The Global Burden of Disease (GBD) study provides comprehensive and consistent values of morbidity and mortality by age, sex, region, and time period, yielding indicators of the major determinants and risk factors that are useful for decision making in health policy^{5,6}.

Healthcare Services in Gulf countries

During the last three decades, increased government spending on healthcare led to improved and enhanced healthcare and related services in the Gulf region. For example, the UAE initiated significant healthcare reforms under the main governing body, the Health Authority – Abu Dhabi (HAAD). Since 2007, the country has introduced a new health insurance coverage plan, enhanced competition through increased privatization, and established a centralized HAAD regulatory system. The UAE has relatively high rates of chronic diseases related to lifestyle, including obesity, diabetes, and CVDs, reflecting the habits of the large expatriate population in the country⁷.

Similarly, under its five-year national health plan (2010–14), Kuwait's Ministry of Health focused on the expansion of the healthcare sector. The country's healthcare operating budget was increased to USD 4.5 billion in 2013 from USD 895 million in 1995. Kuwait's health indicators suggest the burden of disease is skewed toward NCD morbidity, in line with other highly developed countries⁸.

Like Kuwait, Qatar is a high-income country and has invested heavily in its last five-year plan to increase healthcare investments to USD 4.7 billion in 2014 from USD 2.1 billion in 2010. The country has made substantial improvements to its healthcare system, but has exceedingly high rates of certain NCDs (such as obesity and diabetes)⁹.

Saudi Arabia's Ministry of Health (MOH) oversees primary healthcare by providing these services through a network of healthcare centers. The MOH is considered the lead government agency responsible for the management and regulation of the healthcare sector. The Kingdom's health services have

improved significantly in terms of quality and quantity during the last two decades¹⁰.

In Bahrain, the Ministry of Health provides primary healthcare services through 24 health centers and 3 health clinics. The World Health Organization (WHO) has acknowledged Bahrain's continued improvements in healthcare infrastructure during the last three decades, with the setting up of 4 state-sponsored hospitals, 14 private institutions, and a large number of health clinics¹¹.

Oman has consistently invested in its national health system over the last four decades, and developed a network of 180 local, district, and regional healthcare facilities. The country's current five-year plan focuses on community health¹². These programs and increased spending in healthcare are expected to help to reduce the burden of NCDs.

The main objective of the current study is to describe and compare the leading causes of mortality and key risk factors of morbidity in the Gulf countries during 1990–2010. The study provides the individual and combined values of GBD for the Gulf countries during 1990–2010.

MATERIALS & METHODS

The data for this study were obtained from the Institute of Health Metrics and Evaluation (IHME) (www.healthdata.org), University of Washington, Washington, US. The institute provides country-specific burden of disease data and serves as the main data source for collaborators of the Global Burden of Disease study¹³. Ethical approval was not needed for the current analysis as data is publicly available from the IHME. The GBD team releases annual updates of all-cause mortality, deaths by cause, years of life lost due to premature mortality (YLL), years lived with disability (YLD), and disability-adjusted life year (DALY) by country, age, and sex¹⁴.

DALY is a measure of premature mortality and time spent in unhealthy states; it is a sum of YLL and YLD. YLL is calculated by multiplying the number of deaths attributed to a disease with the standard life expectancy at the age of

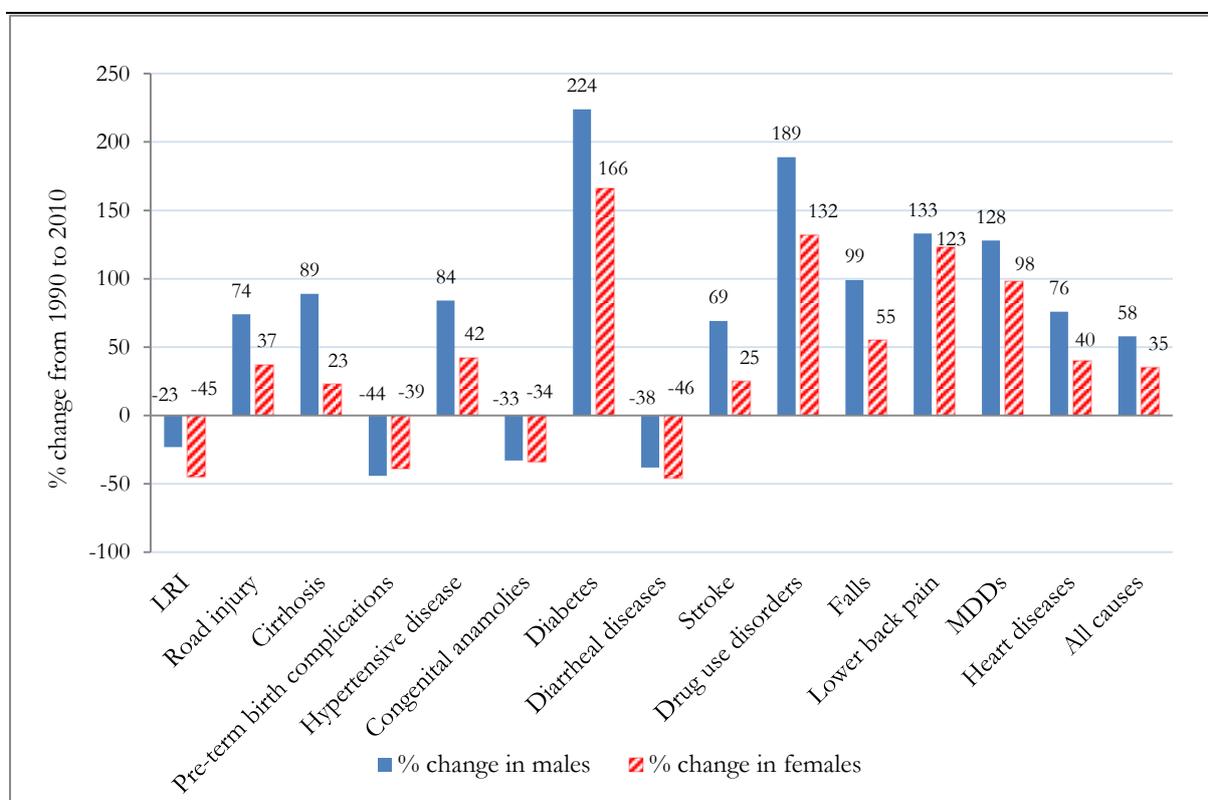
death in years. YLD is calculated by multiplying the prevalence of different diseases or injury sequelae with the associated disability weight for that sequela and the duration until the person with a disease dies or regains a healthy state. Additional details about methods of estimating these different parameters and values can be found in comprehensive public health studies^{5, 6, 13, 14}.

In this study, DALYs, YLDs, and YLLs attributable to the leading causes and risk factors were obtained for the six individual Gulf countries for the period 1990–2010. These values were analyzed for each individual country and combined to obtain the GBD values for the Gulf region during 1990–2010. Previously, Mokdad *et al.* estimated the GBD value for the entire Arab region as a whole and then in three groups of countries classified by income³. We expand on this study to analyze the burden of disease and risk factors in the individual Gulf countries.

RESULTS

Figure 1 shows the percentage change in total DALYs attributable to the leading causes in males and females between 1990 and 2010 in the six Gulf countries. Diabetes increased by over 220% in males and about 166% in females. Moreover, lower back pain, major depressive disorders (MDDs), and heart disease rose by similar or higher rates in males; in addition, there was a notable increase in drug use disorder among males. Furthermore, road traffic injuries rose by a substantial margin in males compared with females. Similarly, cirrhosis and hypertensive diseases exhibited larger gains in males (about 85% and 84%, respectively) than females (23% and 42%, respectively). All causes of higher DALYs increased by more than 50% in males vis-à-vis about 35% in females.

Figure 1. Percentage change in total DALYs attributable to the leading causes in males and females between 1990 and 2010 in the six Gulf countries



Figures 2a and 2b display the percentage of total DALYs by age group among males and

females, respectively, for the six Gulf countries in 1990 and 2010. In Figure 2a, the percentage

of DALYs among males in the age group of below 5 years reduced 68% during the period. However, the percentage of DALYs in the age groups of 15-49, 50-69, and over 70 years gained over 1990-2010. Moreover, similar changes were observed for females in Figure 2b.

Figure 2a. Percentage of total DALYs by age group among males for the six Gulf countries in 1990 and 2010

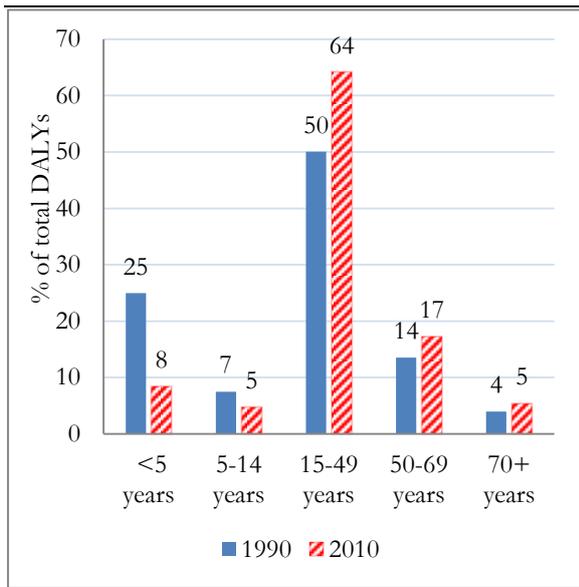


Figure 2b. Percentage of total DALYs by age group among females for the six Gulf countries in 1990 and 2010

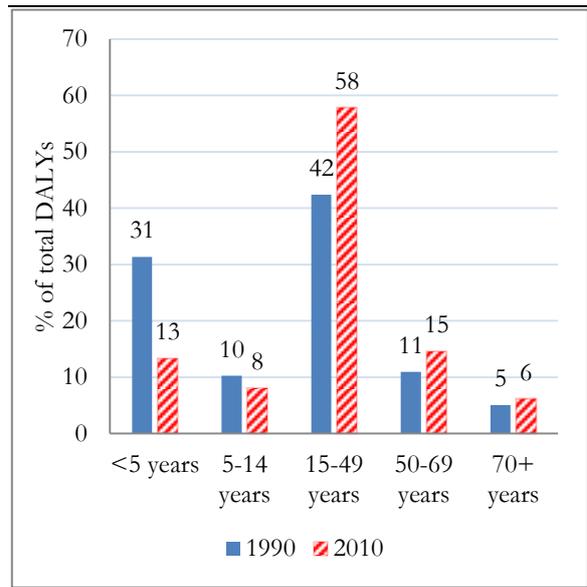
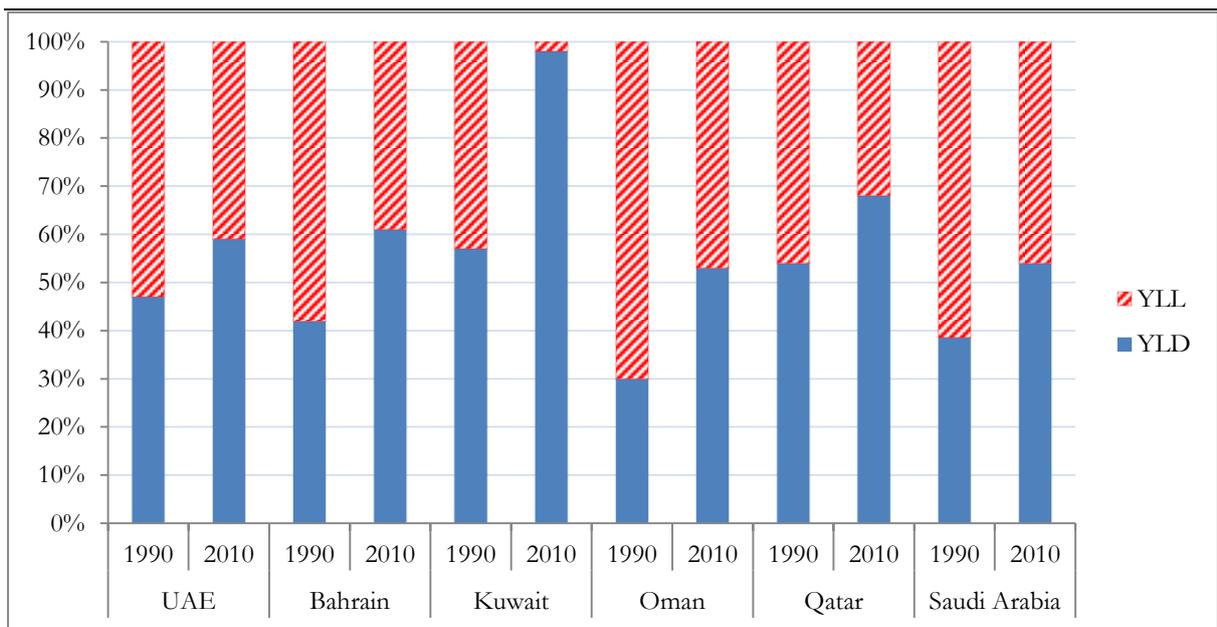


Figure 3 shows the composition of DALY in the form of YLD and YLL in the individual Gulf countries for the years 1990 and 2010. All six Gulf countries witnessed a substantial shift in the composition of DALY with greater contribution of YLD than YLL from 1990 to 2010.

Figure 3. Composition of DALY in the form of YLL and YLD in the six Gulf countries for the years 1990 and 2010



Tables 1 and 2 show the leading risk factors contributing to the percentage of total DALYs

and mortality in the Gulf countries, respectively. The leading risk factor contributing to the

percentage of total DALYs was high body mass index (BMI), followed by dietary risks and high fasting plasma glucose, which is another risk

factor for diabetes. Physical inactivity was the fifth leading risk factor.

Table 1. Burden of disease attributable to 10 leading risk factors in 2010 (expressed as a percentage of total DALYs) in the six Gulf countries

Risk factor	Percentage of total DALYs					
	Kuwait	Bahrain	UAE	Oman	Saudi Arabia	Qatar
High body mass index	11.95	11.00	9.167	7.94	11.47	8.41
Dietary risks	11.71	7.60	8.87	7.92	9.55	5.61
High fasting plasma glucose	7.87	8.73	5.6	7.06	9.39	5.96
High blood pressure	7.55	4.64	5.41	6.19	7.73	3.15
Physical inactivity and low physical activity	6.17	4.92	4.81	4.43	5.25	3.81
Alcohol and drug use	3.64	6.55	5.41	3.87	2.92	5.77
Tobacco smoking	5.20	3.44	4.53	2.23	2.98	2.80
Tobacco smoking, excluding second-hand smoke	4.50	3.19	4.22	2.05	2.74	2.55
Drug use	2.59	2.52	4.59	2.51	2.20	4.57
Child and maternal undernutrition	2.93	2.30	2.46	4.51	3.38	1.99

*Note: The total for each country does not add to 100% as we have listed only the 10 leading risk factors and other factors have been excluded.

Table 2. Burden of disease attributable to 10 leading risk factors in 2010 (expressed as a percentage of total deaths) in the six Gulf countries

Risk factor	Percentage of total deaths					
	Kuwait	Bahrain	UAE	Oman	Saudi Arabia	Qatar
Dietary risks	30.02	17.86	22.61	21.21	24.90	15.72
High blood pressure	23.97	15.01	16.63	19.17	25.77	12.39
High body mass index	22.16	16.62	16.17	12.91	16.99	13.52
High fasting plasma glucose	15.57	15.04	10.13	14.44	16.43	10.7
Physical inactivity and low physical activity	13.58	9.29	10.70	9.78	10.29	8.32
Ambient particulate matter pollution	12.32	6.67	11.08	7.38	11.00	6.69
Tobacco smoking	11.67	9.13	10.72	4.59	6.24	7.743
Low dietary intake of fruits	10.47	5.84	9.06	7.88	9.32	5.75
Tobacco smoking, excluding second-hand smoke	9.99	8.48	9.95	4.26	5.71	6.88
High total cholesterol	9.93	4.82	8.79	5.57	5.14	5.23

*Note: The total for each country may be more or less than 100% as we have listed only the 10 leading risk factors and other factors have been excluded. In addition, the percentage values are estimates.

DISCUSSION

The current study analyzed the leading causes and risk factors of mortality and morbidity in the Gulf region, and examined the changes in the burden of disease during 1990–2010. Moreover, in this study, we offer some

suggestions to reduce the burden of leading diseases in this region. The results of our study showed an increase in the burden of major NCDs, with a noticeable reduction in other types of NCDs such as congenital anomalies and pre-term birth complications, in the six

Gulf countries (Kuwait, Bahrain, Saudi Arabia, the UAE, Oman, and Qatar). The rise in the percentage of total DALYs among the older age groups was largely due to an increase in the prevalence of some major chronic diseases such as diabetes, MDDs, and lower back pain, along with drug use disorders and road traffic accidents. Moreover, the results indicated a significant surge in MDDs during 1990–2010 in the six Gulf countries. In the analysis of burden of disease, the increase in MDDs was higher in males than in females for all the six Gulf countries combined. In 2010, MDDs ranked first at about 8.3% of total DALYs in the Gulf region. Comparatively, the global burden of MDDs was estimated at 2.5% of total DALYs (ranked 11th in 2010)¹⁵. MDDs as the leading cause for higher DALYs can be explained within the context of modernization that has led to substantial lifestyle changes such as unhealthy diet, higher alcohol consumption, increased drug use, physical inactivity, and obesity. These results highlight the need to consider MDDs as a priority issue and allocate additional public health resources for education, prevention, and management of these disorders.

The findings of our study showed a shift in the composition of DALY from YLL to YLD in the six Gulf countries, considering the substantial reduction in infant and child mortality, and increased life expectancy in which people live longer with NCDs¹⁶. The reason for this change was the shift from illnesses with high fatality rate (such as severe infections and diarrhea) to diseases with low fatality rate (such as heart diseases, diabetes, stroke, hypertension, drug use, and cirrhosis).

The rise in the burden of lower back pain is noticeable and typically associated with lower socioeconomic status, lower education level, and occupations requiring repetitive motions¹⁷. Although this condition is not prevalent among locals in the Gulf countries, increased obesity and reduced physical activity associated with sedentary office jobs may increase the risk of lower back pain¹⁸. Furthermore, lower back pain is associated with other common co-

morbidities such as musculoskeletal and neuropathic pain conditions, depression, anxiety, and sleep disorders, which collectively increase the burden on public health systems¹⁹.

The results of our study indicated a significant rise in road injuries among males compared with females. The Gulf countries have some of the highest rates of road traffic accidents in the world²⁰. Rapid development of highway infrastructure, higher disposable income, and lower gas prices have encouraged people in these countries to own and drive automobiles²¹. These countries lack other transport options as public transport infrastructure is almost non-existent and using public transport is unpopular. The reduction of road traffic accidents should be a priority of any public health prevention strategy as policies and interventions are direct and widely recognized²².

High body mass index; unhealthy diets high in salt, sugar and fats; high fasting plasma glucose; and high blood pressure are the leading risk factors that contribute to higher DALYs in the Gulf region. These risk factors were the key causes of NCDs, such as ischemic heart disease and diabetes. Most Gulf countries had the same risk factor profile as they share similar social, economic, and political factors. Tobacco smoking was one of the leading risk factors for higher DALYs. The prevalence of smoking is relatively high in the Gulf countries²³. A common habit in the Middle East is tobacco smoking using a water pipe or “shisha”. In some Middle Eastern countries, water pipe smoking is very popular among adolescents. Most coffee shops in these countries, particularly in Saudi Arabia, provide access to shisha, which increases active and passive smoke exposures. Shisha is offered in a number of flavors to tempt young adults and adults to spend considerable time sampling different flavors. According to some estimates, the volume of smoke inhaled in an hour-long water pipe session is equal to smoking 100–200 cigarettes, resulting in several health problems²⁴. Tobacco smoking is an important modifiable risk factor.

Developing an Effective Health Promotion Strategy for NCDs

A review of NCDs in the Gulf countries by Bonita *et al.* suggested implementing a phased plan for NCDs consisting of multi-sectoral support, capacity building, and implementation of cost-effective interventions with accountability at a national level²⁵. In this study, we strengthen this idea by proposing cost-effective, broad-based health promotion strategies that target the entire lifespan. According to Thompson and Pertschuk, health programs that are cost-effective and targeted at a broader level are the most successful²⁶. Broad-based intervention approaches include: 1) community-based public health information programs; 2) school-based educational initiatives; 3) workplace health information programs; 4) media and Internet health campaigns; and 5) physicians' advice to patients.

1. Community-based public health information programs

Planned community programs are an important strategy to deal with NCDs. A collaboration between countries with different socioeconomic status using the WHO's Countrywide Integrated Non-communicable Diseases Intervention (CINDI) framework showed that community-based prevention programs share general principles for success regardless of the degree of development of the country²⁷. Community-based NCD programs should be inclusive, based on clear rules, and align with the objectives of the national authorities to provide long-term guidance. Broad-based health programs should target the general population and high-risk groups that are medically or socioeconomically at risk. To supplement community-based efforts, numerous policy options can be considered, such as introducing new taxes, higher budget allocations for NCDs, new regulations for cigarette/shisha smoking, and changes in food labels to provide the required information on NCD risks. Moreover, incentives can be provided to individuals in the form of insurance coverage to include more

NCD preventive services such as nutrition counseling and smoking cessation programs.

2. School-based educational initiatives (childhood interventions)

Memish *et al.* affirm that schools must be recognized as a key component of NCD prevention strategies²⁸. Accreditation and revised curriculums should be based on the criteria of the WHO's Health Promoting Schools framework²⁹. In particular, the incorporation of health education, physical activity programs, and access to healthy food items in schools should be promoted for reduction of long-term NCD risk factors.

3. Workplace health programs

The amount of time spent by an employed individual in the workplace is considerable, and there is high potential for health education about NCDs in the workplace. Some examples of workplace interventions include implementing non-smoking policies, introducing healthy food options served in company cafeterias, and offering fitness programs. Workplace health programs for smoking cessation and weight loss, on-site blood pressure monitoring, and educational counselling are known to be effective. Organizations that implement wellness programs demonstrate the value they place on their workers' wellbeing³⁰.

4. Media and Internet health campaigns

The media and Internet allow for widespread dissemination of information. Bahrain's Ministry of Health website has already adapted its content to provide information that target lifestyle and NCD behaviors, with information on food choices, dangers of smoking, combating diabetes, and increasing physical activity. Similarly, other Gulf countries are providing information to reduce NCD risk factors on key government health websites.

5. Physicians' advice to patients

Physicians can advise their patients regarding NCDs during prenatal counselling and provide targeted information for vulnerable groups and the elderly. Additionally, physicians' advice can

help promote behavior changes for those at higher risk of developing NCDs²⁶. Medical school curriculums should include NCDs and risk factor reduction strategies. Curriculum development and training are required for primary care physicians to implement early and appropriate preventative interventions using evidence-based guidelines for NCD risk factors. Moreover, supportive care from health workers (who require training) is essential for long-term quality and consistency of care.

Bonita *et al.* noted that broad-based health promotion programs to tackle NCDs require a strong commitment from the government and the input and cooperation of numerous stakeholders, including the community, industry, business, educational institutions, and the media²⁵. These groups can influence a large number of individuals by educating them and changing their lifestyle behaviors.

CONCLUSION

The results of our study showed a significant rise in the burden of MDDs, lower back pain, and road traffic injuries in the six Gulf countries during 1990–2010. Risk factors were largely behavioral, with high body mass index, dietary factors, and high fasting blood sugar being the leading risk factors for higher DALYs; the impact of these factors on DALYs increased from 1990 to 2010. This corresponded to a rise in ischemic heart disease, stroke, and diabetes during the same period. Moreover, the findings indicated a shift in the composition of DALY from YLL to YLD, implying that lifestyle factors are resulting in an increase in the burden of chronic diseases (more people are living with disabilities). A key element for addressing NCDs is to implement effective, wide-ranging health promotion strategies. Broad-based health promotion strategies to tackle NCDs comprise five main pillars to provide information in the community, workplace, schools, healthcare settings, and through popular media (such as television, radio, and the Internet). Collectively, these broad-based health programs supported by multiple stakeholders can reach all age groups to provide constructive health messages

over a longer timeframe. New health policies should be cost-effective and focus on health behavior modification to reduce the “cluster” of modifiable NCD risk factors.

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